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**Stem cell reprogramming: basic implications and future perspective for movement disorders.**

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**Public Summary:**

In this review we discuss the practical application of human pluripotent stem cell technologies toward understanding and treating neurological disease.

**Scientific Abstract:**

The introduction of stem cell-associated molecular factors into human patient-derived cells allows for their reprogramming in the laboratory environment. As a result, human induced pluripotent stem cells (hiPSC) can now be reprogrammed epigenetically without disruption of their overall genomic integrity. For patients with neurodegenerative diseases characterized by progressive loss of functional neurons, the ability to reprogram any individual's cells and drive their differentiation toward susceptible neuronal subtypes holds great promise. Apart from applications in regenerative medicine and cell replacement-based therapy, hiPSCs are increasingly used in preclinical research for establishing disease models and screening for drug toxicities. The rapid developments in this field prompted us to review recent progress toward the applications of stem cell technologies for movement disorders. We introduce reprogramming strategies and explain the critical steps in the differentiation of hiPSCs to clinical relevant subtypes of cells in the context of movement disorders. We summarize and discuss recent discoveries in this field, which, based on the rapidly expanding basic science literature as well as upcoming trends in personalized medicine, will strongly influence the future therapeutic options available to practitioners working with patients suffering from such disorders.

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